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Butterfly Fauna of Katerniaghat Wildlife Sanctuary, Uttar Pradesh

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ABSTRACT

The terms “butterfly” are often thought of as the natural groups that make up the order Lepidoptera but butterflies are more closely related to the larger moths than either group is to the more primitive families of moths. It is important that one of the indicator

species groups represents the insects. Insects are by far the most species-rich group of animals, representing over 50% of terrestrial biodiversity. The tremendous butterfly diversity of is strongly influenced by the many ecological regions that stretch beyond her borders. They are valuable pollinators when they move from plant to plant, gathering nectar and are the one of the important food chain components of the birds, reptiles, spiders and predatory insects. They are also good indicators of environmental quality as they are sensitive to changes in the environment. The present study was performed to assess the distribution and status of butterflies in Katerniaghat Wildlife Sanctuary of India from March 2015 to August 2015. Field data was collected by conducting random surveys by all out search method, when butterflies are most active, i.e. in the morning 09:00 am to 11:00 am and evening 15:30 pm to 17:30 pm. Butterflies were identified in the field with the help of field guides Kehimkar Issac (2008); Kunte (2000). Specimen collection was strictly avoided. The study revealed that butterflies distributed throughout the Katerniaghat Wildlife Sanctuary are influenced by food accessibility and habitat. In the present survey, 42 species of 31 genera of butterflies were recorded from the Katerniaghat Wildlife Sanctuary. Out of 42 family Papilionidae has 6 species, Pieridae has 11 species, Lycaenidae has 4 species and Nymphalidae has 21 species of butterflies. Identification is one key to understanding the biology of a species, it might then be possible to develop conservation and management strategies to ensure the future of the butterflies.

Keywords: Butterflies, Katerniaghat Wildlife Sanctuary, Lepidoptera, Species

1. INTRODUCTION

Habitat is a prime concern of wildlife watchers and conservationists, and butterfly enthusiasts are no exception. The tremendous butterfly diversity of is strongly influenced by the many ecological regions that stretch beyond her borders. The terms "butterfly" are often thought of as the natural groups that make up the order Lepidoptera but butterflies are more closely related to the larger moths than either group is to the more primitive families of moths. It is important that one of the indicator species groups represents the insects. Insects are by far the most species-rich group of animals, representing over 50% of terrestrial biodiversity (Mora *et al.,* 2011; Noordijk *et al.,* 2010). Contrary to most other groups of insects, butterflies are well-documented, easy to recognize and popular with the general public. Cultural myth and lore honour the butterfly as a symbol of transformation because of its impressive process of metamorphosis. Christianity considers the butterfly as a symbol for the soul. Since the insect is so fragile it can be torn apart by a hard rain, the butterfly stands for human frailty, both moral and physical.

There are about 2, 00,000 species of Lepidoptera out of which approximately 17,200 species of butterfly throughout the world, of which 1,501 species of butterfly are known from India (K. Kunte, 2000). It is concluded that butterflies represent adequate indicators of change for many terrestrial insect groups, but recommended that similar schemes be extended to other popular groups, especially dragonflies, bumblebees, hoverflies and ants. Comparisons with similarly measured changes in native bird and plant species suggest that butterflies have declined more rapidly than these other groups (Thomas *et al.,* 2004). Butterflies are taxonomically an important group, which have received a reasonable amount of attention throughout the world (J.Ghazoul, 2002). Many of butterfly species are strictly seasonal and prefer only a particular set of habitats (Kunte, 1997) and they are good indicators in terms of anthropogenic disturbance and habitat quality (Kocher and Williams, 2000).They are valuable pollinators when they move from plant to plant, gathering nectar and are the one of the important food chain components of the birds, reptiles, spiders and predatory insects. They are also good indicators of environmental quality as they are sensitive to changes in the environment.

Checklists are aids to active butter fliers as they are a concise compilation of the species known to occur in a local area. The study focuses to know the status, distribution, threats and conservational measure needed for Butterflies in Katerniaghat Wildlife Sanctuary.

LEPIDOPTERA

Members of Lepidoptera are distinguished in the adult stage by the dense covering of overlapping scales on the head, body and appendages, including the two pairs of membranous wings. Wingspans range from about 3 mm to 280 mm. About 17% of all life forms on earth are members of this order Lepidoptera which is the second largest order after Coleoptera. Order Lepidoptera comprises moths, butterflies and skippers. There are about 2, 00,000 species of Lepidoptera out of which 15,000 species belong to butterflies (Papillionoidea) and remaining are moths and skippers (Holloway *et .al.,* 1992). The Lepidoptera is a major group of plant eating organism and thus is immensely economically important in agriculture, horticulture and forestry. Lepidoptera species utilize all parts of plants- roots, trunk, bark, branches, twigs, leaves, buds, flowers, fruits, seeds, galls and fallen material. The Lepidoptera species have played important roles in biological science. The complex patterns on wings provide an excellent base for study of genetics and embryology.

KATERNIAGHAT WILDLIFE SANCTUARY

Katerniaghat Wildlife Sanctuary (KWS) is one such protected area, which was established in 1975 in the Bahraich district of Uttar Pradesh (U.P.) covering 400.69 km2 in the Terai Landscape. This sanctuary is located close to Indo- Nepal border. The KWS was conducted in 27˚55" to 28˚25"N latitudes and 81˚to 81˚25"E longitudes (Tripathi *et al.,* 2009). It comprises of the forest in the ranges named Katernighat, Nishangarh, Murtiya, Motipur, Rampurwa, Dharampur, Kakraha. The Girwa River in the KWS provides large river habitats in an intact setting upstream of major diversions and rivers alternations.The sanctuary also forms an important corridor of connectivity between the dudhwa Tiger Reserve in India and the Bardia National Park in Nepal.

2. MATERIALS AND METHODS

The present study was performed to assess the distribution and status of butterflies in Katerniaghat Wildlife Sanctuary of India from March 2015 to August 2015 (Fig. 1). Katerniaghat Wildlife Sanctuary (KWS) is one such protected area, which was established in 1975 in the Bahraich district of Uttar Pradesh (U.P.) covering 400.69 km2 in the Terai Landscape. This sanctuary is located close to Indo-Nepal border. The KWS was conducted in 27˚55" to 28˚25"N latitudes and 81˚to 81˚25"E longitudes (Tripathi *et al.,* 2009). It comprises 7 ranges named Katernighat, Nishangarh, Murtiya, Motipur, Rampurwa, Dharampur, Kakraha. The Girvan River in the KWS provides large river habitats in an intact setting upstream of major diversions and rivers alternations.

Field data was collected by conducting random surveys by all out search method, when butterflies are most active, i.e. in the morning 09:00 am to 11:00 am and evening 15:30 pm to 17:30 pm. Butterflies were identified in the field with the help of field guides Kehimkar Issac (2008); Kunte (2000). Specimen collection was strictly avoided. We followed commonly used paths leading into the forests to survey butterflies in the surrounding area of tribal villages. Once we entered forests, we walked either along these paths, waded through forest streams. We recorded each and every butterfly species that we saw perched overhead, on surrounding vegetation, or in flight at any distance from us. Each record was noted in field notebooks on the spot, and most species, including the commonest ones, were photographed in the field for reference by using Canon EOS 70 D SLR camera.

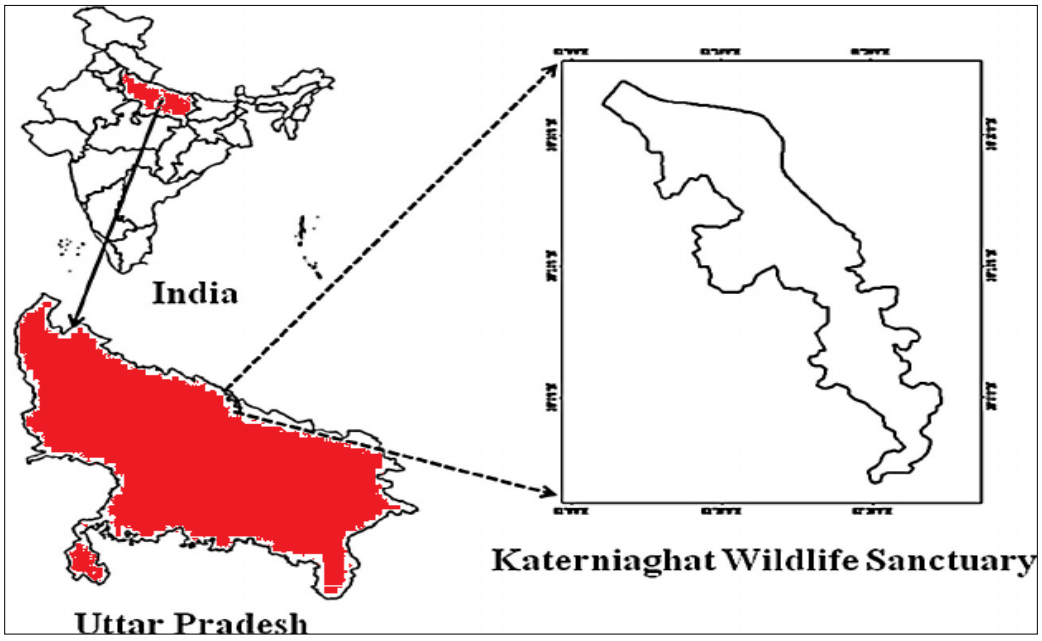


Figure 1 Map of study area

3. RESULT AND DISCUSSION

The study revealed that raptors distributed throughout the Katerniaghat Wildlife Sanctuary are influenced by food accessibility and habitat. In the present survey, 42 species of 31 genera of butterflies were recorded from the Katerniaghat Wildlife Sanctuary (Table

1). The 86 butterfly species listed in Delhi constitute quite a high number, given its climatic extremes. However the 86 butterflies of Delhi are not equally common (T. B. Larsen, 2002). 54 species categorized under seven families out of 14 families occurring in Nepal. Most of the recorded species were common to moderately common in status inhabiting open areas and visitors of water sources and flowers (Khanal *et al.,* 2006). The butterflies of Madhya Pradesh and Chhattisgarh reviewed and recorded 174 species/subspecies of 100 genera under eight families (Chandra *et al.*; 2007). Study of 28 species from district Una in Himachal Pradesh (P.C. Pathania and A. Kumari, 2009), A record of total of 41 butterfly species in district Hoshiarpur, Punjab and total 145 species of butterflies in the Nagpur city (G. Sharma and P.C. Joshi, 2009, Tiple *et al.,* 2009)). *The 30 species of butterflies* belonging to 22 genera and 4 families, which include Papilionidae (6 species), Pieridae (8 species), Nymphalidae (14 species) and Lycaenidae (2 species) of Nawabganj Bird Sanctuary, Unnao, in which Danaus chrysippus and Junonia almana were very common species and Euploea core and Papilio demoleus rare in observation *(Kanaujia et al., 2015)*.

Table 1 List of Butterflies reported from Katerniaghat Wildlife Sanctuary

SN	Family	Common Name	Scientific Name	Study Sites					
				KT	NG	MT	MR	DM	KK
1.	Papilionidae	Common/ Blue Jay	*Graphium doson*	+	+	_	+	_	+
2.		Spot Swordtail	*Graphium nomius*	_	_	_	_	+	_
3.		Common Mormon	*Papilio polytes*	+	+	+	+	+	+
4.		Common Rose	*Astrophaneura aristolochiae*	+	_	_	_	_	_
5.		Common Raven	*Papilio castor*	_	_	_	+	_	_
6.		Lime Butterfly	*Papilio demoleus*	+	+	+	+	+	+
7.	Pieridae	Mottled emigrant	*Catopsila pyranthe*	+	+	_	_	_	+
8.		Small Grass Yellow	*Eurema brigitta*	+	+	+	_	+	+
9.		Yellow Orange Tip	*Ixias pyrene*	_	+	_	+	+	+
0.		Common Grass Yellow	*Eurema hecabe*	+	+	_	+	+	+
1.		One Spot Grass Yellow	*Eurema andersoni*	+	+	+	+	+	+
2.		Common Emigrant	*Catopsilia pomona*	+	+	_	+	+	+
3.		Common Wanderer	*Pareronia valeria*	_	+	_	+	_	+
4.		Psyche	*Leptosia nina*	+	+	+	+	_	+
5.		Common Gull	*Cepora nerissa*	+	_	+	+	+	+
6.		Common Jezebel	*Delias eucharis*	_	+	_	+	+	+
7.		Pioneer	*Anaphaeis aurota*	+	_	+	+	+	+
8.	Lycaenidae	Common Pierrot	*Castalius rosimon*	+	+	+	_	_	+
9.		Dark Cerulean	*Jamides bochus*	+	_	_	+	_	+
0.		Dark Grass Blue	*Zizeeria karsandra*	_	+	_	+	_	+
1.		Pale Grass Blue	*Pseudozizee ria maha*	+	_	_	+	_	_
2.	Nymphalidae	Plain tiger	*Danaus chrysippus*	+	+	_	+	+	+
3.		Common Tiger	*Danaus genutia*	+	+	+	+	+	+
4.		Dark Blue Tiger	*Tirumala septentrionis*	_	_	+	+	_	_
5.		Common Crow	*Euploea core*	+	+	+	+	+	+
6.		Common Evening Brown	*Melanities leda*	+	_	+	+	_	+
7.		Tawny Coaster	*Acraea terpsicore*	+	_	+	+	+	_
8.		Common Leopard	*Phalanta Phalantha*	+	+	_	_	+	+
9.		Common Map	*Cyrestis thyyodamas*	+	_	_	_	_	_
0.		Common Lascar	*Pantpporia hordonia*	_	+	+	+	_	+

1.		Common Sailer	*Neptis hylas*	+	_	_	_	_	_
2.		Baronet	*Euthalia nais*	_	+	+	+	+	+
3.		Common Castor	*Aridine merione*	+	_	+	+	+	+
4.		Painted Lady	*Vanessa Cynthia*	+	_	_	_	+	_
5.		Blue Pansy	*Junoni aorithiya*	_	+	+	+	+	+
6.		Peacock pansy	*Junonia almana*	_	+	_	+	+	+
7.		Brown pansy	*Junonia hedonia*	+	_	+	+	+	+
8.		Chocolate pansy	*Precis iphita*	_	+	_	+	_	+
9.		Lemon Pansy	*Junonia lemonias*	_	+	+	+	+	+
0.		Yellow Pansy	*Junonia hierta*	+	_	_	+	_	+
1.		Danaid eggfly	*Hypolimnas misippus*	+	+	+	+	+	+
2.		Great Egg fly	*Hypolimnas bolina*	+	_	_	+	_	_
TOTAL				**29**	**25**	**20**	**33**	**24**	**32**

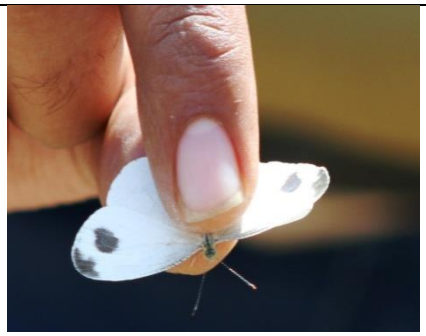
Legends: Katernighat= KT, Nishangarh=NG, Murtiya=MT, Motipur & Rampurwa=MR, Dharampur= DM Kakraha= KK, Present= +, Absent= -

Table 2 Overview of taxonomic diversity of butterflies of the Katerniaghat Wildlife Sanctuary

Family	Number of genera	Number of species	Number of species at Study site					
			KT	NG	MT	MR	DM	KK
Papilionidae	3 (10%)	6 (14%)	4	3	2	4	3	3
Pieridae	9 (29%)	11 (26%)	8	9	5	9	8	11
Lycaenidae	4 (13%)	4 (10%)	3	2	1	3	0	3
Nymphalidae	15 (48%)	21 (50%)	14	11	12	17	13	15
Total	**31(100%)**	**42(100%)**	**29**	**25**	**20**	**33**	**24**	**32**

Legends: Katernighat= KT, Nishangarh=NG, Murtiya=MT, Motipur & Rampurwa=MR, Dharampur= DM Kakraha= KK

Table 3 Some of Glimpses of Butterflies reported from Katerniaghat Wildlife Sanctuary



Psyche

Blue Pansy

Common Grass Yellow

		
Common Albatross	**Common Crow**	**Common Emigrant**
		
Pioneer	**Common Mormon**	**Common Pierrot**
		
Common Wanderer	**Great Eggfly**	**Lemon Pansy**
		
Lime Butterfly	**Painted Lady**	**Plain Tiger**
		
Common Tiger	**Dark Cerulean Female**	**One spot Grass Yellow**

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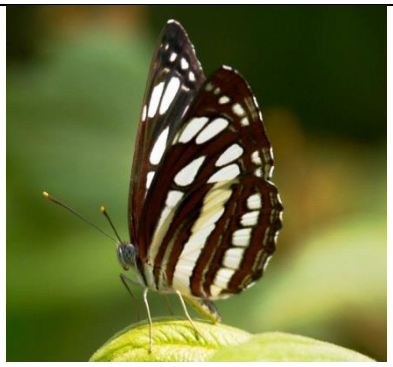
Common Map	**Dark Grass Blue**	**Peacock Pansy**
		
Tawny Coster	**Danaid Eggfly**	**Common Sailer**
		
Common Jezebel	**Pale Grass Blue**	**Yellow Pansy**
		
Dark Grass Blue	**Baronet**	**Common Emigrant Female**

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Common Castor

Common Grass Yellow

Common Emigrant

Comman Jay (Male)

Common Leopard

Yellow orange Tip

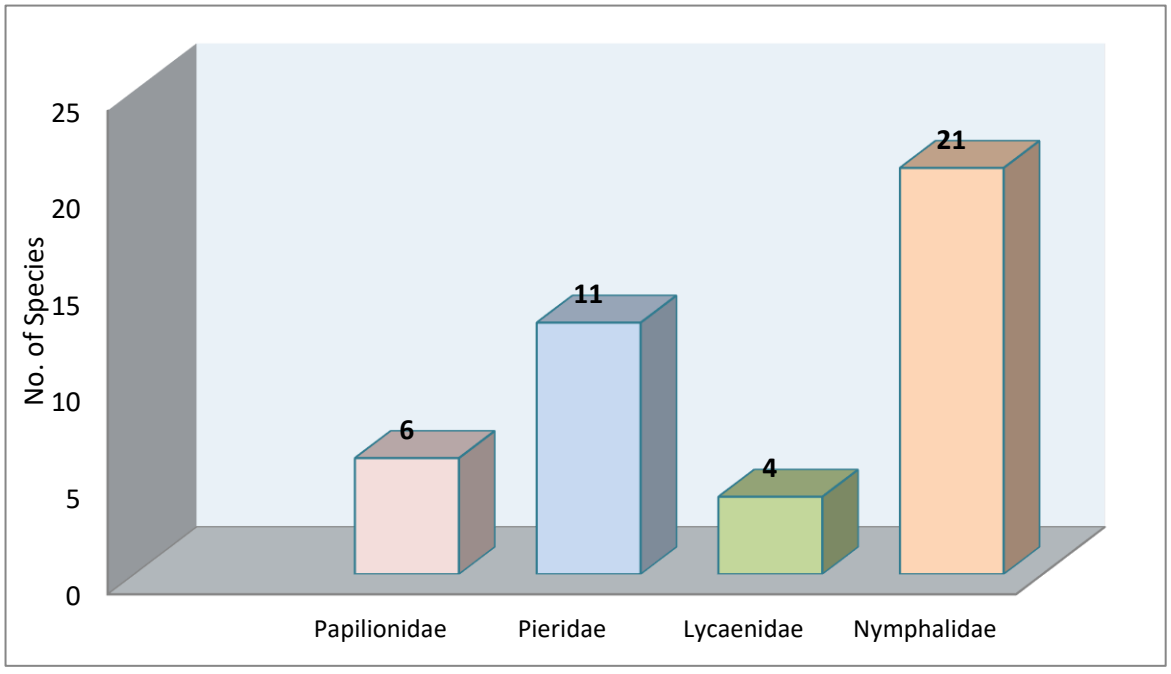

Figure 2 Species composition of Butterflies species in Katerniaghat Wildlife Sanctuary according family

Mud Puddling:
A butterfly cannot live on sugar alone; it needs minerals, too. To supplement its diet of nectar, a butterfly will occasionally sip from mud puddles, which are rich in minerals and salts. This behavior, called puddling, occurs more often in male butterflies, which incorporate the minerals into their sperm. These nutrients are then transferred to the female during mating, and help improve the viability of her eggs.

Out of 42 family Papilionidae has 6 species (14%), Pieridae has 11 species (26%), Lycaenidae has 4 species (10%) and Nymphalidae has 21 species (50%) of butterflies (Table 2 & 3 and Fig. 2 & 3). A.P. Singh (2010) his study revealed the presence of 71 species of butterflies and documentation of 298 butterfly species and recorded the number of individuals of each species. They also report significant range extensions of two Schedule I species: *Elymnias peali* and *Prothoe franck regalis*, from the Garo Hills (Kunte *et al*., 2012). Butterflies distributed in different ranges i.e. Katernighat (30 species), Nishangarh (25 species), Murtiya (23 species), Motipur & Rampurwa (34 species), Dharampur (24 species), Kakraha (32 species) according to habitat and food requirements. During the survey we observed that butterflies sat on the wet mud, cow dung and rotting plant in groups and suck up the fluid, phenomenon known as mud-puddling (Fig. 4). From the fluids they obtain nutrients such as salts and amino acids that play various roles in their physiology, ethology and ecology. Identification and documentation is one key to understanding the biology of a species, it might then be possible to develop management and conservation strategies to ensure the future of the butterflies.

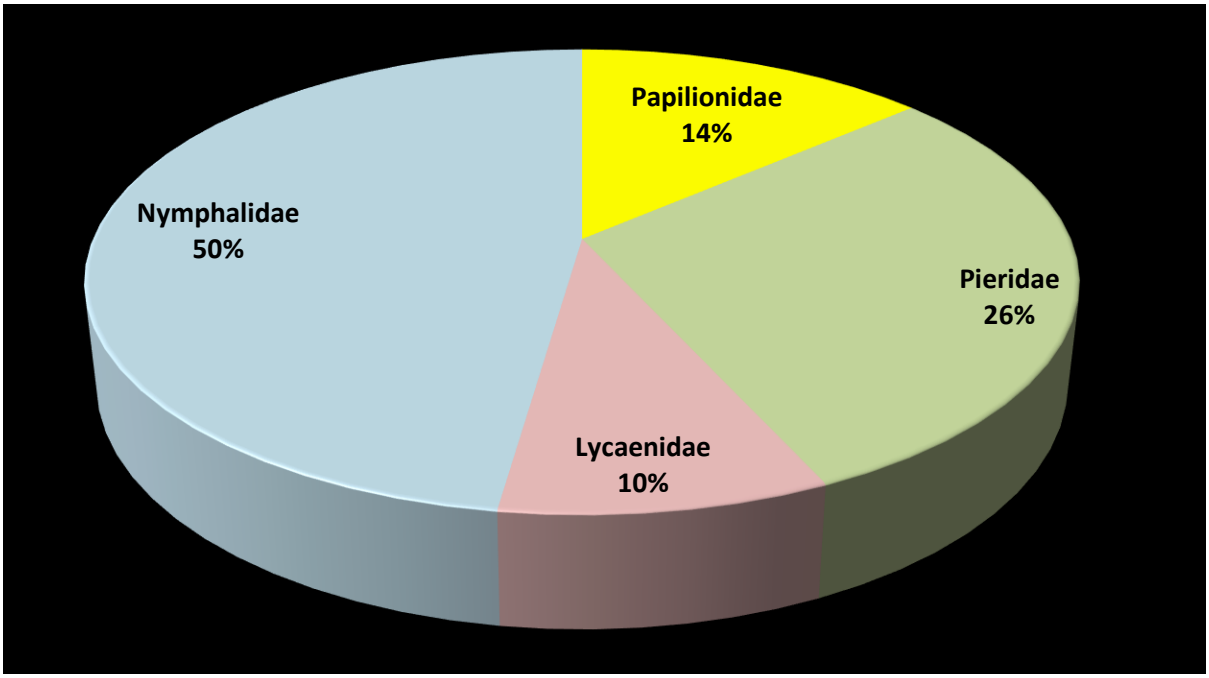

Figure 3 Family wise Percentage compositions of Butterflies species of Katerniaghat Wildlife Sanctuary

Figure 4 Mud-puddling by different species of Butterflies

Butterflies Parks:
Butterfly parks have been set up in several countries to conserve them, to breed them, to allow visitors to see them and to conduct research. India's first butterfly park was opened on November 25, 2006 in Bangalore. Others butterfly parks are in shimla, Pune,Chandigarh, Sikkim (first open air butterfly park) and Goa cities of India.

4. CONCLUSION

Checklists are aids to active butter fliers as they are a concise compilation of the species known to occur in a local area. The study focuses to know the status, distribution, threats and conservational measure and optimal management for biodiversity of butterflies as bio-indicators and umbrella species needed for Butterflies in Katerniaghat Wildlife Sanctuary and all the districts of Uttar Pradesh. These findings emphasize the significance of the Katerniaghat Wildlife Sanctuary for butterfly conservation in India, and our work forms a baseline for future quantitative work on the diversity and conservation of butterflies in this biodiversity hotspot.

SUMMARY OF RESEARCH

1. Butterflies are valuable pollinators when they move from plant to plant, gathering nectar and are the one of the important food chain components of the birds, reptiles, spiders and predatory insects. They are also good indicators of environmental quality as they are sensitive to changes in the environment. The present study was performed to assess the distribution and status of butterflies in Katerniaghat Wildlife Sanctuary.
2. In the present survey, 42 species of 31 genera of butterflies were recorded from the Katerniaghat Wildlife Sanctuary. Out of 42 family Papilionidae has 6 species (14%), Pieridae has 11 species (26%), Lycaenidae has 4 species (10%) and Nymphalidae has 21 species (50%) of butterflies.
3. Range wise distribution of species revealed three significant clusters disgustingly separated by the level of human disturbance. Forest habitats supported maximum number of species endemic to Katerniaghat Wildlife Sanctuary.
4. The study recommend that protection of such habitat, nectar plants and establishment of such habitats in the form of *"Butterflies Parks"* to help in the conservation of butterflies, awareness and education programmes for people that contribute in butterflies conservation.

FUTURE ISSUES

Katerniaghat Wildlife Sanctuary has a rich butterfly's diversity. Using common species lists, or expected species list, as an index for ratio extrapolation can be an approach to estimating assessment completeness and species richness. To Comparing diversity between habitats using rarefaction curves allows for accurate comparisons between habitats even when sample sizes are low or disparate. Community-level analysis through ordination can be a describe species composition and distinguishing unique community assemblages in future.

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